

# Upper Rappahannock River Basin Total Maximum Daily Load Study

Rappahannock and Rapidan  
Technical Advisory Committee Meetings  
July 27, 2006



# Meeting Agenda

- Water Quality Assessments and TMDL Process  
Bryant Thomas, VA DEQ
- Overview of Rappahannock 16 TMDL  
Bryant Thomas, VA DEQ
- Bacteria TMDL Source Assessment  
Byron Petrauskas, Engineering Concepts, Inc.
- Questions

# Why are we here?

## Purpose of the Project:

To develop Total Maximum Daily Loads (TMDLs) for 16 bacteria impaired stream segments in the Upper Rappahannock River Basin.

# Getting Started

- Monitor and assess water quality for 305(b) Report.
- Place any waters not meeting Water Quality Standards on 303(d) List.
- Develop TMDL for each listed water.



# Water Quality Standards

- Waters are listed as impaired based on Water Quality Standards (WQS).
- WQS:
  - Regulations based on federal and state law.
  - Set numeric and narrative limits on pollutants.
  - Consist of designated use(s) and water quality criteria.

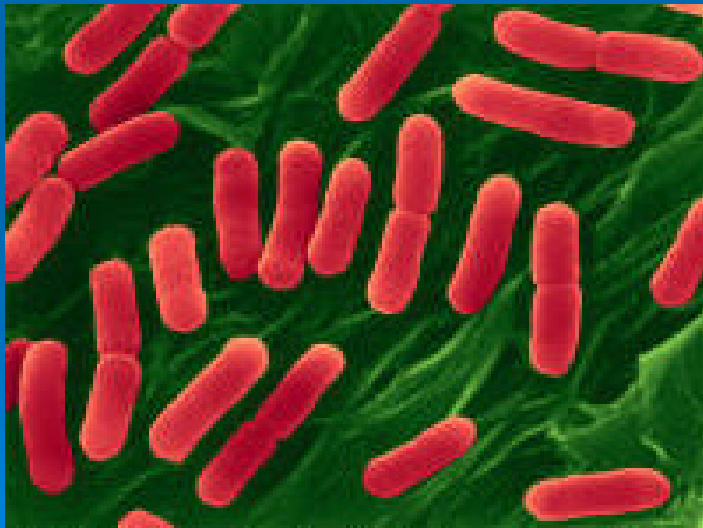
# Designated Uses

- Recreational
- Aquatic Life
- Public Water Supply
- Wildlife
- Fish Consumption
- Shellfish



# ***Fecal Coliform Bacteria and E. coli Bacteria***

- For primary contact recreation use, waters are assessed using fecal coliform and *E. coli* bacteria measurements.



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## **Fecal bacteria:**

- Found in the digestive tract of humans and warm blooded animals.
- Indicator of the potential presence of pathogens in waterbodies.

## ***E. coli:***

- subset of fecal coliform bacteria.
- correlate better with swimming-associated illness.

# Summary of Changes in Primary Contact Criteria

Indicator	Status	Instantaneous Maximum (cfu/100mL)	Geometric Mean (cfu/100 mL)
Fecal Coliform	Old	1,000	200
<i>E. coli</i>	New	235	126
Fecal Coliform	Interim	400	200

- Changes went into effect on January 15, 2003
- Both New *E. coli* and Interim Fecal Coliform criteria apply
- Fecal coliform criteria will be phased out entirely once 12 *E. coli* samples have been collected or after June 30, 2008

# TMDL Process in Virginia

- Three Step TMDL Process in Virginia
  - TMDL Development - find the source of the pollutant & determine the reduction needed.
  - Implementation Plan Development - identify conservation measures to fix the problem. Conservation measures are often called Best Management Practices or BMPs.
  - Implement the BMPs and sample to see improvement.

# What is a TMDL ?

## *Total Maximum Daily Load*

A TMDL is a **pollution budget**:

$$\text{TMDL} = \text{Sum of WLA} + \text{Sum of LA} + \text{MOS}$$

Where:

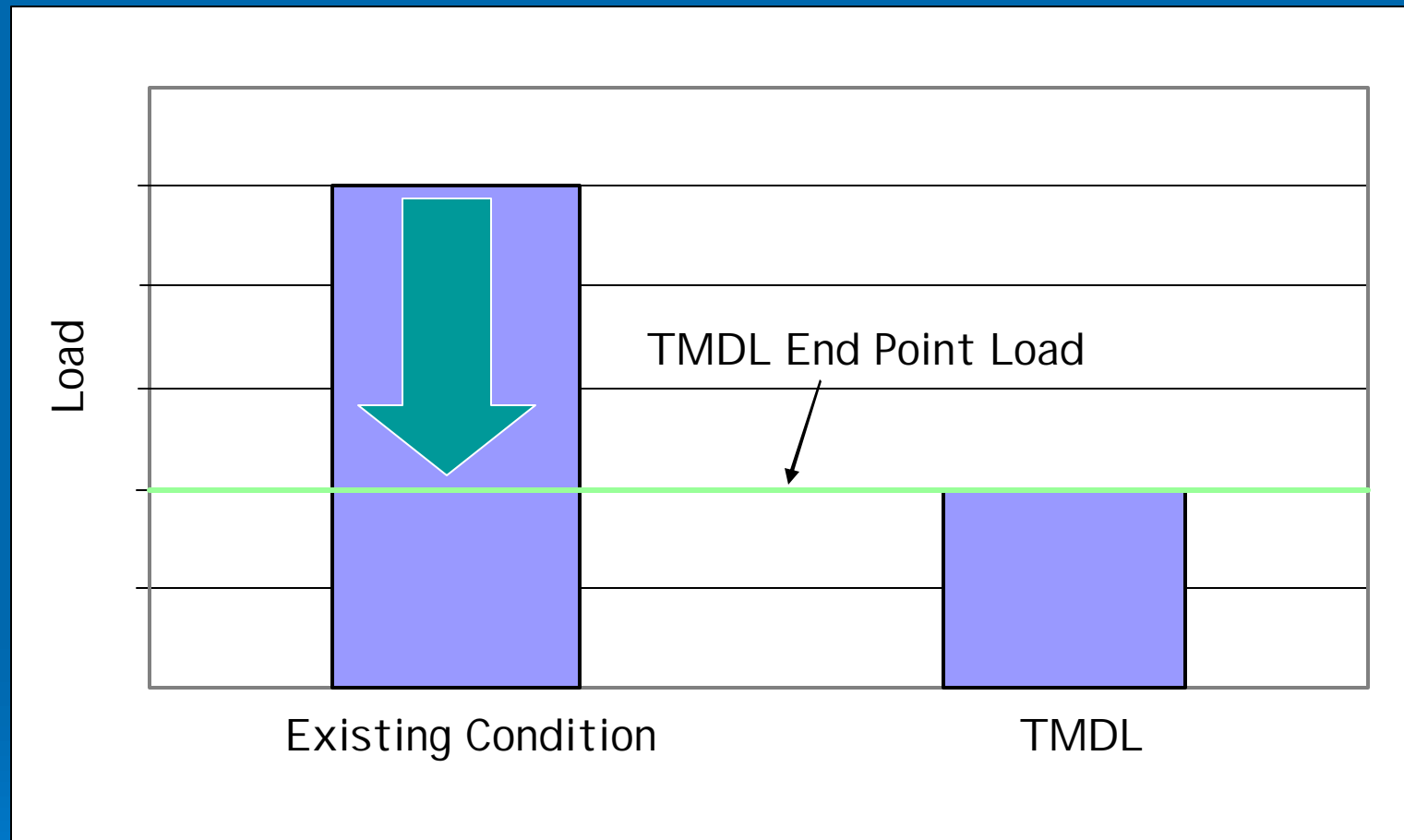
TMDL = Total Maximum Daily Load

WLA = Waste Load Allocation (point sources)

LA = Load Allocation (nonpoint sources)

MOS = Margin of Safety

# An Example TMDL



**Reducing existing bacteria load to the TMDL end point load is expected to restore water quality.**

# Required Elements of a TMDL

A TMDL must:

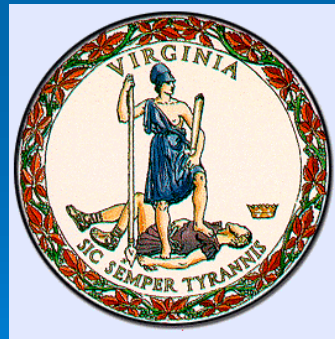
- Be developed to meet Water Quality Standards.
- Be developed for critical stream conditions.
- Consider seasonal variations.
- Consider impacts of background contributions.
- Include wasteload and load allocations (WLA, LA).
- Include a margin of safety (MOS).
- Be subject to public participation.
- Provide reasonable assurance of implementation.

# TMDL Development Methodology

- Identify all types of sources of a given pollutant within the watershed.
- Calculate the amount of pollutant entering the stream from each source type.
- Calculate the pollutant reductions needed, by source, to attain Water Quality Standards.
- Allocate the allowable loading to each source and include a margin of safety.

# Roles of DEQ and DCR in TMDL Development

- DEQ is the lead for TMDL development.
- DEQ is responsible for ensuring public participation and submitting TMDLs to EPA for approval.
- DCR is the lead for nonpoint source TMDL Implementation Plans and implementation (including MS4 permits).

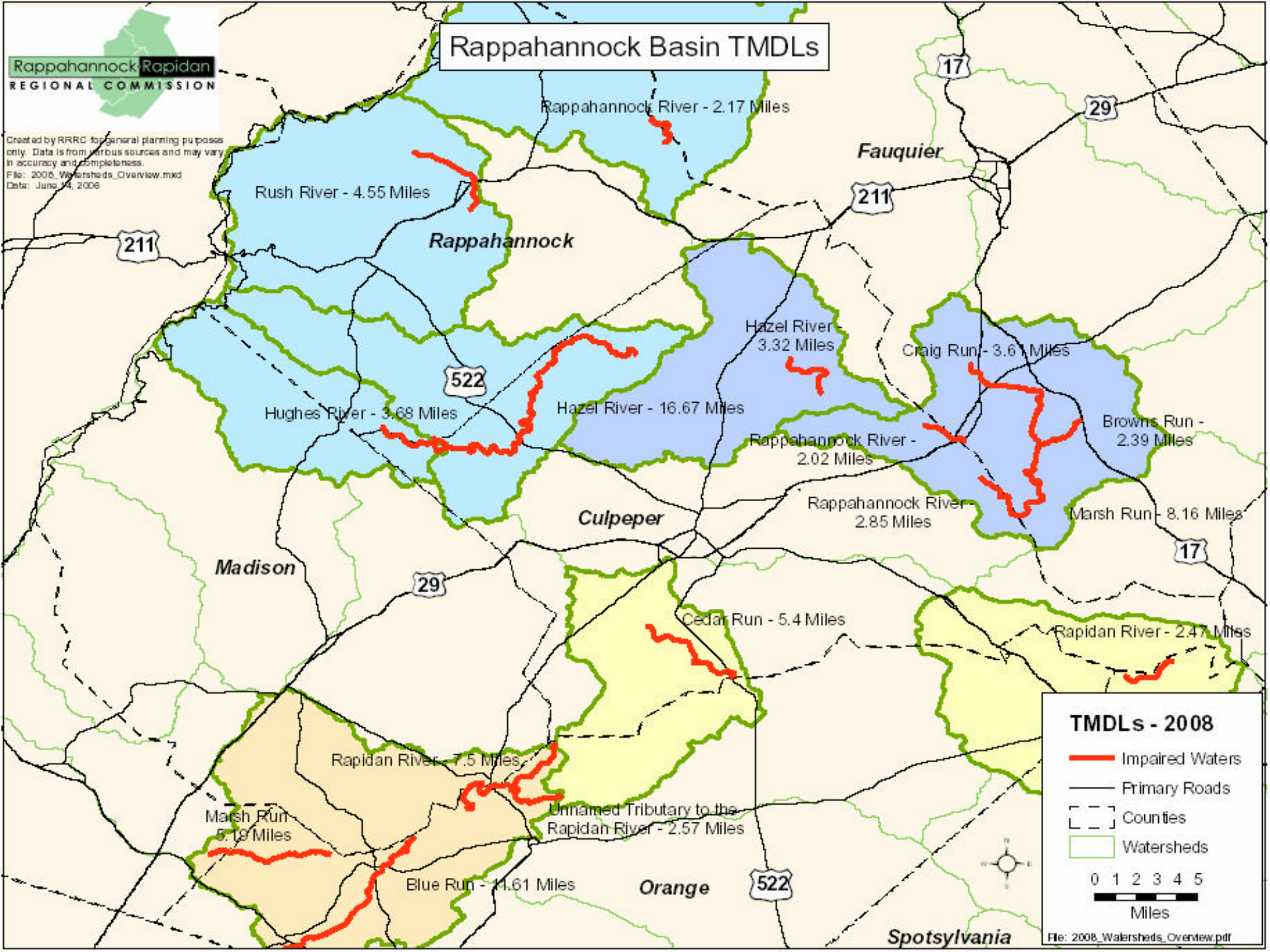


# Upper Rappahannock River Basin TMDL



# Project Background

- 16 segments in Rappahannock River Basin.
- Listed on Virginia's Section 303(d) list for violations of the state fecal coliform standard applied for contact recreational uses.
- Covers 8 Counties (Albemarle, Culpeper, Fauquier, Greene, Madison, Orange, Rappahannock, and Spotsylvania).
- Two TACs:
  - Upper Rappahannock Watershed TAC
  - Rapidan Watershed TAC



Rappahannock Watershed Technical Advisory Committee					
Stream Name	Locality	Impairment	Length (miles)	Upstream Limit	Downstream Limit
Hughes River	Culpeper Rappahannock	Bacteria	3.68	Kilbys Run	Hazel River
Hazel River	Culpeper	Bacteria	16.67	Rt. 707 Bridge	Unnamed Tributary
Hazel River	Culpeper	Bacteria	3.32	Indian Run	Muddy Run
Rush River	Rappahannock	Bacteria	4.55	Unnamed Tributary	Big Branch
Rappahannock River	Fauquier Rappahannock	Bacteria	2.17	Jordan River	UT
Marsh Run	Fauquier	Bacteria	8.35	Craig Run	Rappahannock River
Browns Run	Fauquier	Bacteria	2.39	Unnamed Tributary	Marsh Run
Craig Run	Fauquier	Bacteria	3.61	Headwaters of Craig Run	Marsh Run
Rappahannock River	Culpeper Fauquier	Bacteria	2.02	Ruffans Run	Tinpot Run
Rappahannock River	Culpeper Fauquier	Bacteria	2.85	Unnamed Tributary	Marsh Run

## Rapidan Watershed Technical Advisory Committee

Stream Name	Locality	Impairment	Length (miles)	Upstream Limit	Downstream Limit
Blue Run	Orange	Bacteria	11.61	Headwaters of Blue Run	Rapidan River
Rapidan River	Culpeper Madison Orange	Bacteria	7.5	Poplar Run	Robinson River
Marsh Run	Greene Madison Orange	Bacteria	5.19	Headwaters of Marsh Run	Rapidan River
Unnamed Tributary to Rapidan River	Madison Orange	Bacteria	2.57	Headwaters of Unnamed Tributary	Rapidan River
Cedar Run	Culpeper	Bacteria	5.4	Buck Run	Rapidan River
Rapidan River	Culpeper Spotsylvania	Bacteria	2.68	Wilderness Run	Middle Run

# Changes to Original Proposal

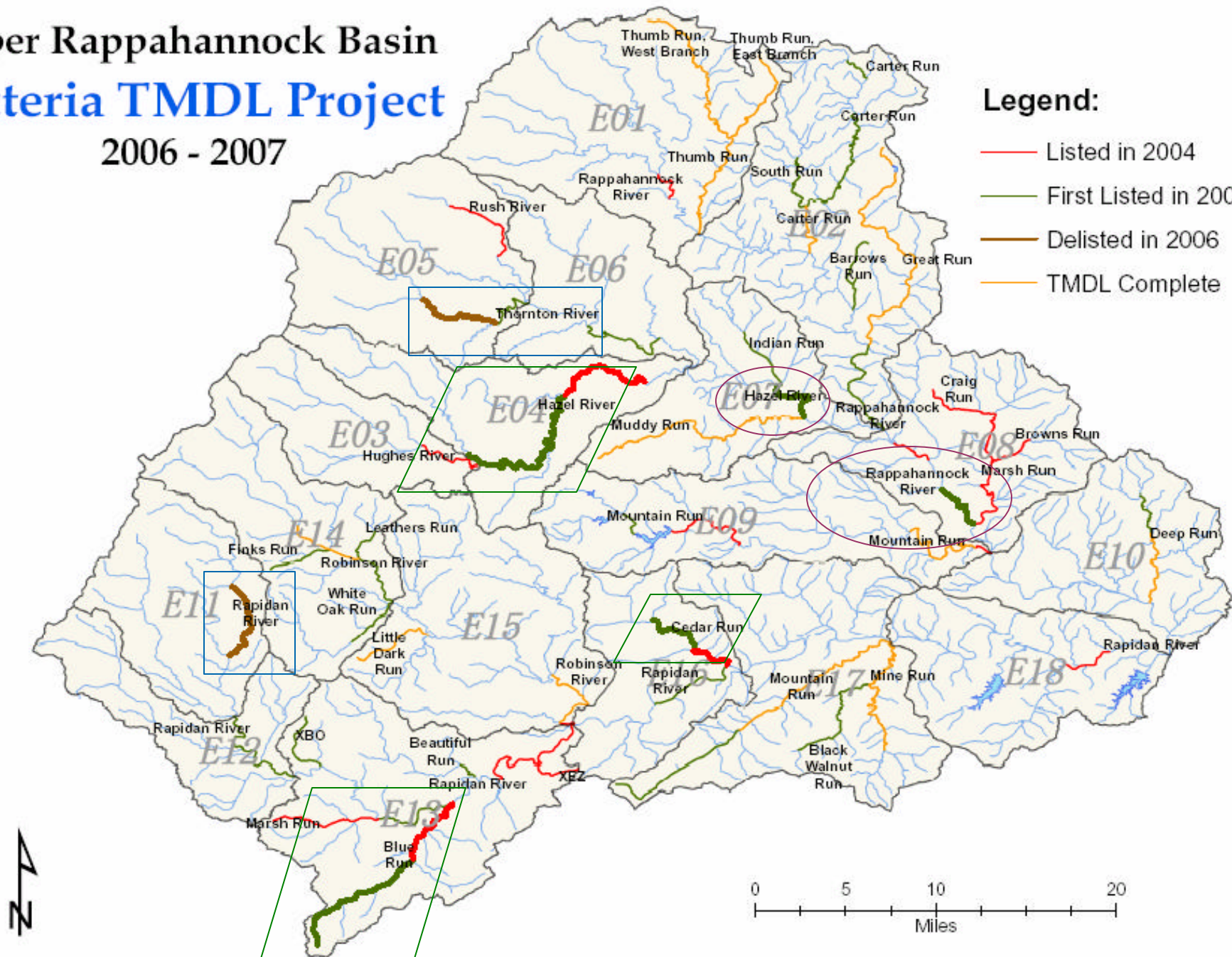
- 16 Segments were initially listed in the proposal.
- Following the 2006 Integrated Assessment:
  - 2 segments were delisted:
    - Thornton River (4.28 mile segment: VAN-E05R)
    - Rapidan River (4.80 mile segment: VAN-E11R)
  - 3 segments were extended:
    - Hazel River (Extended from 5.58 miles to 16.67 miles: VAN-E04R))
    - Blue Run (Extended from 4.21 miles to 11.61 miles: VAN-E13R)
    - Cedar Run (Extended from 2.19 miles to 5.40 miles: VAN-E16R)
  - 2 segments were added:
    - Rappahannock River (2.85 mile segment: VAN-E08R)
    - Hazel River (3.32 mile segment: VAN-E07R)
- 16 Segments were listed in the final proposal.

# Upper Rappahannock Basin Bacteria TMDL Project

2006 - 2007

## Legend:

- Listed in 2004
- First Listed in 2006
- Delisted in 2006
- TMDL Complete



# DEQ Monitoring Stations for Upper Rappahannock

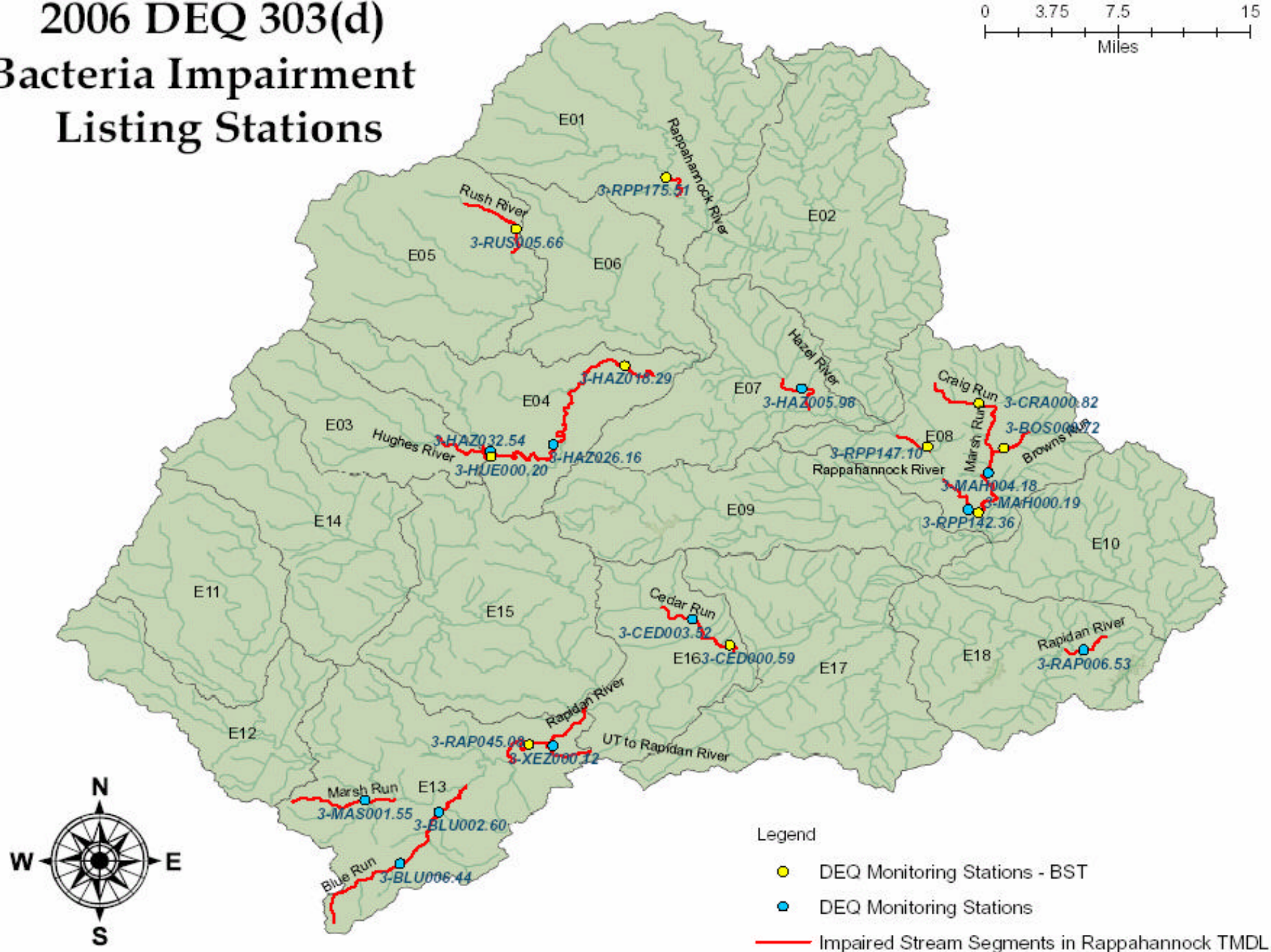
TMDL ID	Stream Name	Monitoring Station	Station Location	Year First Listed as Impaired	2004 Exceedance Rate <i>Fecal Coliform Standard</i>	2006 Exceedance Rate	
						<i>Fecal Coliform Standard</i>	<i>E. Coli Standard</i>
VAN-E08R-02	Browns Run	3-BOS000.72	Route 653	2002	57% (4 of 7)	100% (3 of 3)	N/A
VAN-E08R-03	Craig Run	3-CRA000.82	Route 656	2004	43% (3 of 7)	100% (3 of 3)	N/A
VAN-E04R-01	Hazel River	3-HAZ018.29	Route 729	2002	20% (4 of 20)	15% (3 of 20)	33% (3 of 9)
		3-HAZ026.16	Route 522	2006	N/A	33% (2 of 6)	33% (2 of 6)
		3-HAZ032.54	Route 644	2006	N/A	21% (3 of 14)	N/A
60076	Hazel River	3-HAZ005.98	Route 625	2006	N/A	36% (5 of 14)	50% (5 of 10)
VAN-E03R-01	Hughes River	3-HUE000.20	Route 644	2004	12% (2 of 17)	16% (3 of 19)	36% (4 of 11)
VAN-E08R-01	Marsh Run	3-MAH000.19	Route 651	1996	21% (3 of 14)	N/A	29% (2 of 7)
		3-MAH004.18	Route 668	1996	44% (4 of 9)	75% (3 of 4)	N/A
VAN-E08R-04	Rappahannock River	3-RPP147.10	Route 15/29	2004	22% (8 of 37)	N/A	39% (5 of 13)
VAN-E01R-03	Rappahannock River	3-RPP175.51	Route 647	2002	16% (3 of 19)	N/A	29% (4 of 14)
60081	Rappahannock River	3-RPP142.36	Route 620	2006	N/A	N/A	29% (2 of 7)
VAN-E05R-01 9/6/2006	Rush River	3-RUS005.66	Route 683, upstream of Route 211/522	2002	24% (4 of 17)	22% (4 of 18)	44% (4 of 9)

# DEQ Monitoring Stations for the Rapidan

TMDL ID	Stream Name	Monitoring Station	Station Location	Year First Listed as Impaired	2004 Exceedance Rate <i>Fecal Coliform Standard</i>	2006 Exceedance Rate	
						<i>Fecal Coliform Standard</i>	<i>E. Coli Standard</i>
VAN-E13R-01	Blue Run	3-BLU002.60	Route 20	2002	40% (8 of 20)	35% (7 of 20)	50% (3 of 6)
		3-BLU006.44	Bridge for an unnamed road through Tibbstown	2006	N/A	40% (2 of 5)	N/A
VAN-E16R-01	Cedar Run	3-CED000.59	Route 522	2004	25% (5 of 20)	15% (2 of 13)	N/A
		3-CED003.52	Route 652	N/A	N/A	38% (3 of 8)	100% (3 of 3)
VAN-E13R-03	Marsh Run	3-MAS001.55	Route 644	2004	67% (2 of 3)	31% (4 of 13)	N/A
VAN-E13R-02	Rapidan River	3-RAP045.08	Route 15	2002	29% (10 of 35)	N/A	43% (6 of 14)
VAN-E18R-01	Rapidan River	3-RAP006.53	Route 610	2002	32% (12 of 38)	N/A	58% (7 of 12)
VAN-E13R-04	Unnamed Tributary to Rapidan River	3-XEZ000.12	Route 634	2004	100% (2 of 2)	43% (3 of 7)	40% (2 of 5)

# 2006 DEQ 303(d) Bacteria Impairment Listing Stations

0 3.75 7.5 15  
Miles



# Role of Technical Advisory Committee in TMDL Development

- TACs provide technical input and guidance to the TMDL process.
- Requested to:
  - Review data, methods, processes.
  - Advise of technical issues.
  - Assist with public outreach process.

# Project Schedule

Kick Off TAC Meeting – July 27, 2006

First Round of Public Meetings:

Wednesday, October 4, 2006

Wednesday, October 11, 2006

Tuesday, October 17, 2006

Wednesday, October 18, 2006

Second TAC Meeting:

December 2006

Third TAC Meeting:

March 2007

Second Round of Public Meetings:

March 2007

Draft TMDL Document:

March 2007

Final TMDL Document sent to EPA:

April 2007

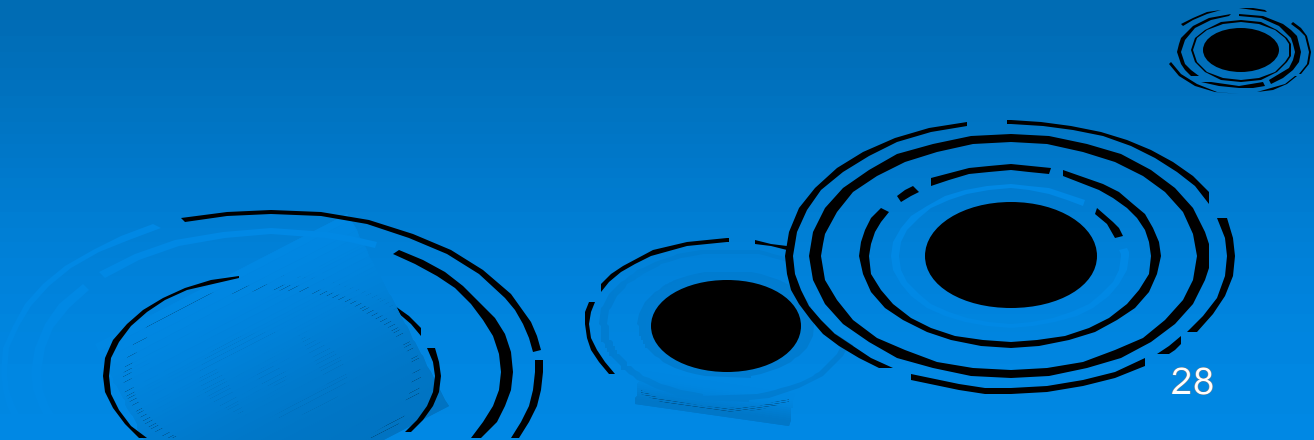
# DEQ Contacts:

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# Backup Slides



# Previous Bacteria Standard

Indicator species: fecal coliform

## Instantaneous max:

**1,000 cfu/100 mL**

- Applicable for data sets with 1 or fewer samples in 30 days
- Used in **water quality assessment** because monitoring is usually conducted **bimonthly**

## Geometric mean:

**200 cfu/100 mL**

- Applicable for data sets with 2 or more samples in 30 days
- Used in TMDL development because model output is usually **daily**

# Interim Bacteria Standard

## New fecal coliform criteria:

- interim criteria necessary for transition from fecal coliform to *E. coli*
- will be phased out when 12 *E. coli* observations available or after June 30, 2008

## Instantaneous max:

**400 cfu/100 mL**

Applicable for all data sets; no more than 10% of samples in a calendar month may exceed the maximum

## Geometric mean:

**200 cfu/100 mL**

Applicable for data sets with 2 or more samples in a calendar month

# Applicable Bacteria Standard

New indicator species: *E. coli*

**Instantaneous max:**

**235 cfu/100 mL**

Applicable for all data sets; no samples may exceed the maximum

**Geometric mean:**

**126 cfu/100 mL**

Applicable for data sets with 2 or more samples in a calendar month

# Virginia TMDLs

- Clean Water Act §303(d) and 40 CFR §130.7 requires development of TMDLs
- In 1999, EPA signed a Consent Decree with lawsuit plaintiffs, agreeing to develop TMDLs in Virginia
- VDEQ is required to develop TMDLs and Implementation Plans (IPs) under state statute (Water Quality Monitoring, Information, and Restoration Act - WQMIRA)

# Consent Decree

- There was a 1998 lawsuit filed by the American Canoe Association and the American Littoral Society against EPA for failure to comply with CWA §303(d) in Virginia because not enough TMDLs were being done. TMDLs have always been in the CWA, but few states were doing them.
- A 1999 Consent Decree from the lawsuit requires EPA and Virginia to complete 636 TMDLs by 2010